

## CLAIMS

1. A method of improved ectopic beat detection by an implantable cardiac rhythm management device comprising the steps of:

- 5 (a) providing a cardiac rhythm management device having an atrial event detector, a ventricular event detector and a microprocessor-based controller coupled to the atrial event detector and the ventricular event detector and programmed to determine PR intervals, RR intervals and AA intervals from detected atrial and ventricular events;
- 10 (b) determining an average time interval between an atrial event and next occurring ventricular event over a predetermined number of heartbeats cycles ( $PR_{AVG}$ ); and
- 15 (c) indicating an ectopic beat when a PR interval of a given heartbeat cycle is less than about 80 percent of  $PR_{AVG}$  and less than about 80 ms in length.

2. The method of Claim 1 and further including a step of determining whether said given heartbeat cycle is possibly ectopic when the PR interval of said given heartbeat cycle is less than about 80 percent of  $PR_{AVG}$  and the PR interval of said given heartbeat cycle is greater than about 80 ms.

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3. The method of Claim 2 wherein the step of determining whether said given heartbeat cycle is possibly ectopic comprises:

- 25 (a) computing whether a ratio of a RR interval for said given heartbeat cycle to the AA interval of the said heartbeat cycle is less than about 90 percent of the RR to AA ratio for an immediately preceding heartbeat cycle;
- (b) computing whether the ratio of the length of the PR interval of said given heartbeat cycle to the length of the PR interval for an immediately preceding heartbeat cycle is less than about 60 percent;
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(c) Determining that a ventricular depolarization followed the atrial depolarization in the given heartbeat cycle; and

(d) determining whether a QRS complex of said given heartbeat cycle is by biphasic.

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4. A method for identifying ectopic beats using an implantable cardiac rhythm management device comprising the steps of:

(a) providing an implantable cardiac rhythm management device having a means for sensing atrial depolarization signals (P-waves), means for sensing ventricular depolarization signals (R-waves), and a microprocessor-based controller coupled to receive the P-waves and the R-waves signals;

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(b) programming the microprocessor-based controller to measure an average time interval length between the occurrence of a P-wave and a next subsequently occurring R-wave over a predetermined number of heartbeat cycles ( $PR_{AVG}$ );

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(c) determining whether the time interval length between a given P-wave and a next subsequently occurring R-wave (PR interval) is less than a predetermined percentage of the measured  $PR_{AVG}$ ;

(d) determining whether the PR interval falls into a non-physiologic range; and

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(e) declaring the next subsequently occurring R-wave following the given P-wave as an ectopic beat when the determination made in steps (c) and (d) are both true.

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5. The method as in Claim 4 wherein said predetermined percentage is less than about 80 percent.

6. The method as in Claim 4 wherein said non-physiologic range is a PR interval that is less than about 80 ms.

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7. The method as in Claim 4 and further including the step of:

(a) determining whether the PR interval is physiologic when said determination made in step (c) is true and the determination made in step (d) is false; and

5 (b) declaring the next subsequently occurring R-wave following said given P-wave as a normal beat when the PR interval is determined to be physiologic.

8. The method as in claim 4 and further including the step of:

10 (a) providing a dynamic PVARP for one heartbeat cycle following detection of an ectopic beat.